

A large, stylized graphic on the left side of the page features a circular arrow pointing upwards and to the right. The arrow is composed of several overlapping, semi-transparent layers in shades of blue, grey, and green. The background is a light blue sky with a white horizon line, and a green landscape is visible at the bottom left.

PLAN CINCINNATI

a comprehensive plan for the future

Utilities and Infrastructure Existing Conditions Report Supplement October 6, 2010

Table of Contents

1 Purpose	3
2 Utilities and Infrastructure-1925, 1948, 1980	5
3 Water and Sewer Management	7
• Greater Cincinnati Water Works	
• Water Quality	
• Metropolitan Sewer District	
• Floodplain Management	
•	
4 Energy	15
• Smart Grid	
• Alternative Energy Sources	
5 Communication	19
• Telephone	
• Cellular	
• Broadband	
6 Sustainable Infrastructure	21
• Sustainability	
• Communities of the Future	
• Techniques	
• Plans and Partnerships	

Purpose

To our Working Group Members, and others interested in Plan Cincinnati:

This document is the second in a series of Existing Conditions Reports for Plan Cincinnati.

The information in this document is provided to give basic background information that is appropriate for use by the **Utilities and Infrastructure** Working Group.

On September 2, 2010, we released the first Existing Conditions report, which was appropriate for use by all 12 Working Groups. This document is a supplement to that report, and others will be released that will focus on information and data that is needed for each Working Group.

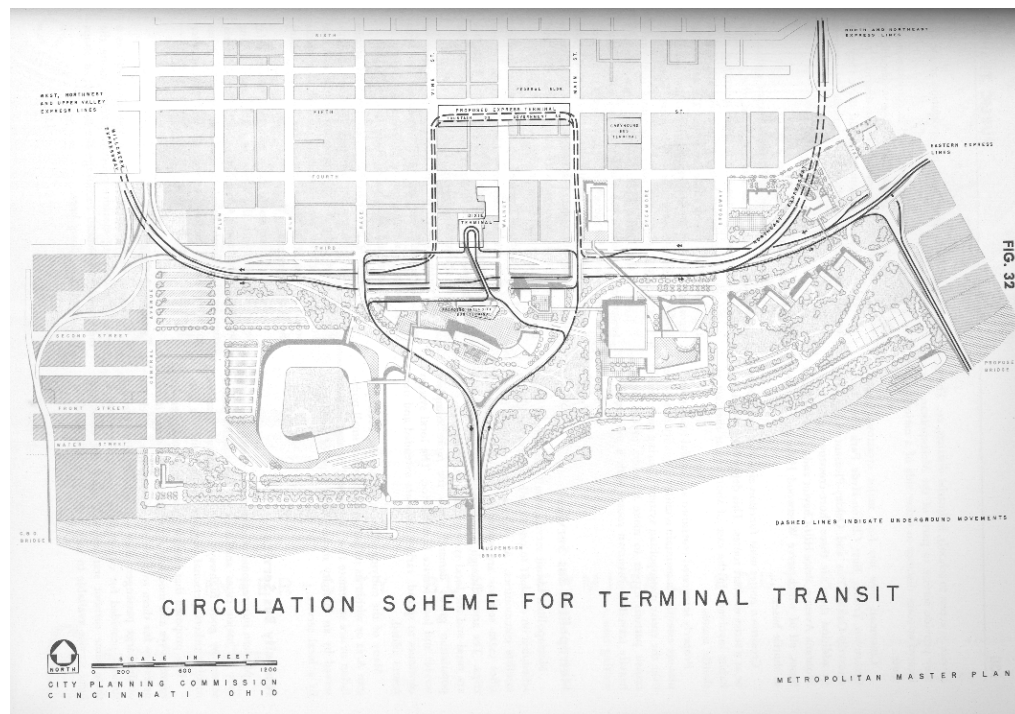
All of the information and data provided is based not only on what was requested by individual Working Groups, but also the information that Planning Staff felt was necessary to provide so that

Working Group members were armed with the background necessary to make good decisions. For that reason, not all pieces of information or data requested will be contained in these documents, and not everything contained was requested by a Working Group.

All Existing Conditions Reports released will be available to the public on our website: www.plancincinnati.org and we encourage you to review all of the Reports, not only those that pertain to your particular Working Group.

The maps in this and future documents may be scaled to fit the document, and are not appropriate for detailed viewing. For this reason, all maps will be available in their original size on our website.

Thank you for your participation in Plan Cincinnati! We hope you enjoy this process of learning more about our City.



Source: Cincinnati Metropolitan Master Plan (1948)

Utilities and Infrastructure in Past Comprehensive Plans

Cincinnati holds a prestigious position in the history of Planning in our nation. In 1925, Cincinnati was the first city in the United States to have a Comprehensive Plan approved by a City Council. Since that time, there have been only two other Comprehensive Plans - in 1948 and in 1980.

The following is an analysis of how each of these plans addresses Transportation.

Official Plan of the City of Cincinnati (1925)

The 1925 Comprehensive Plan was a very general plan, with visionary ideas. The scope of the plan aimed to coordinate with the region's needs, not only the needs of the City. Citizen involvement was stressed very heavily; the plan suggested including citizen groups, contests with prizes, exhibits of the plan in libraries and museums, and even cartoons about the plan to be deployed in the newspaper.

The general location of Garbage Disposal Facilities was a primary concern for the City, in order to care for the handling of ashes, rubbish and garbage produced. Distribution of population was used as the main criteria to determine the location of a plant. Other criteria for the location of the plant included the method of treatment, wind direction and its orientation with respect to residential districts.

The plan emphasized the transportation of garbage and the use of proposed devices to minimize the nuisances associated with refuse and garbage. It was also suggested that the location of a plant should be close to rail and water transportation facilities.

Based on the per capita production of garbage in Cincinnati at that time, it was estimated that in the future Cincinnati would need two units handling one hundred tons per day of garbage at each plant. As per the zoning ordinance at that time, the most logical location for the plant would be Industrial "C" districts. However, alternative locations were suggested, specifically around the Mill Creek Valley.

Cincinnati Metropolitan Master Plan (1948)

The scope of the 1948 plan is the whole Metropolitan Area (defined in the plan as urbanized portions of Hamilton County in Ohio, and Kenton and Campbell counties in Kentucky). This plan aims to assess the existing conditions of all of these areas, and then, through intergovernmental cooperation, address the needs of the community to ensure healthful living conditions and the highest degree of economic well-being possible.

To accomplish this goal, the plan acts as a guide, showing relationships between different aspects of the community, and it estimates conditions that will exist in the future. In doing this, the plan realizes goals that may be set very short-term, or for ten years in the future.

The Coordinated City Plan: Volumes I and II (1980)

The four primary objects of the Plan are to: plan to produce with our available limited assets; plan to develop the assets of a mature city; plan to conserve and rehabilitate in order to avoid costly replacement; and, plan to improve the quality of the physical environment rather than expand the quantity of physical facilities. During this plan's development, Cincinnati was facing decreased revenue. Because of this, redevelopment and seeking new sources of revenue became themes of the plan. This makes the plan seem like more of an analysis of existing conditions than anything else.

In 1948, the plan forecasted a rise in population and employment, and increases in development. In 1980, population was not projected to grow, and the City's revenue was no increasing. On top of that, the demand for services was increasing. Because long-range trends and conditions are impossible to predict accurately, the 1980 Coordinated Plan focuses on many short-range projects geared towards the realities of funding.

The second volume of the 1980 plan outlines "Strategies for Comprehensive Land Use." These strategies are structured around three basic

concepts. The first is that the physical setting of Cincinnati is that of a well-developed city with an established and easily recognizable urban form. The “form” of Cincinnati being that the residential areas are generally on the hilltops, the non-residential uses are generally in the valley corridors, and the two are separated by undeveloped hillside. The second concept characterizes Cincinnati as a “mature city” with a declining or stabilized population, limited tax revenue, and increasing demands for public services. This means that planners must look at the priorities of the city as a whole and recognize the economic constraints that shape its development. The third concept is that the plan is a process and a set of documents. The process follows a method whereby the plan map recommendations incorporate on a continuing basis all proposals adopted by City Council and all proposals from other sources that conform to the strategies and policies.

The 1980 plan proposes many improvements to the City’s sewer system, as well as the extension of

utility services beyond Cincinnati’s corporate boundaries. In 1977, the Cincinnati Water Works began a five-year capital improvement plan that would extend to 1981. One of the sources of funding for the Capital Improvement Plan was the U.S. Environmental Protection Agency. This source provided Cincinnati with research grants that allowed for Water Works to begin a comprehensive research program to enhance water quality.

The City of Cincinnati had been considering the development of a resource recovery center rather than contracting new landfills. A private firm submitted a proposal to establish said center at the former Center Hill incinerator. No capital expenditures would be involved since the private firm would be renting or purchasing the incinerator.

Few capital funds had been provided in the years prior to the 1980 plan for necessary sewer improvements.

Water and Sewer Management

Greater Cincinnati Water Works (GCWW)

On June 25, 1839, Cincinnati Water Works became the first municipally-owned water system in Ohio when the City of Cincinnati purchased a privately owned water company for \$300,000. With two steam pumps, 3½ miles of iron pipe and 19 miles of wooden pipe, Cincinnati Water Works provided just over one million gallons of raw Ohio River water per day to approximately 45,000 people.

Today, Greater Cincinnati Water Works (GCWW) remains a municipally owned and operated utility. GCWW now produces over 48 billion gallons of high quality drinking water annually and serves more than 900,000 consumers in the Greater Cincinnati area including the entire City of Cincinnati, the majority of Hamilton County, parts of Butler, Warren, and Clermont Counties in Ohio and the City of Florence and Boone County in northern Kentucky.

GCWW drinking water is produced at two treatment plants. The Richard Miller Treatment Plant, located in the community of California, treats surface water pumped from the Ohio River and supplies drinking water to 88% of GCWW customers. The Charles M. Bolton Treatment Plant, located in the City of Fairfield, treats ground water pumped from wells in the Great Miami Aquifer and supplies 12 % of GCWW customers.

GCWW uses the latest treatment techniques in these state-of-the-art facilities. The granular activated carbon (GAC) treatment process utilized at the Miller Plant has received numerous awards. GAC treatment is considered to be the best way to remove organic materials from drinking water. GCWW pioneered the use of GAC treatment and the GAC facility at the Miller Plant remains one of the largest GAC facilities in the U.S. From these treatment plants, the water is pumped into our distribution system that consists of 21 pumping stations, 23 tanks and reservoirs, and approximately 3,000 miles of water main. This

water reaches the taps of over 235,000 residential and commercial accounts.

Water Quality

GCWW performs over 600 tests daily to ensure safe drinking water, including:

- Testing of water after each step in the treatment process.
- Water samples from the distribution system are analyzed in GCWW laboratories.
- Monitors with alarms are located throughout the treatment plants and in the distribution system to continuously monitor water quality.
- Source waters are tested routinely before they enter treatment plants.

The Ohio Environmental Protection Agency reviews test results monthly to ensure that health standards are consistently met.

GCWW water met or exceeded all state and federal health standards for drinking water in 2009.

A Water Quality Report is prepared annually to meet the EPA's National Primary Drinking Water Regulation for Consumer Confidence Reports (CCRs).

A full copy of the 2009 Water Quality Report is available at: www.cincinnati-oh.gov/water/downloads/water_pdf38998.pdf

Ultraviolet (UV) Disinfection

Construction is slated to begin in late 2010 at Greater Cincinnati Water Works' (GCWW) Richard Miller Treatment Plant to install Ultraviolet (UV) Disinfection treatment technology - one of the most significant advancements in water treatment technology since Granular Activated Carbon (GAC) became the standard in the 1990's.

UV disinfection has been identified by the US Environmental Protection Agency as one of the best technologies to inactivate pathogenic microorganisms, such as cryptosporidium (crypto) in drinking water. With the addition of UV, GCWW will be the only water utility in the nation

to use sand filtration followed by GAC and UV creating a true multi-barrier treatment approach for protecting public health.

To reduce GCWW's carbon footprint, a component of the UV project includes installation of solar panels atop the new facility and a second installation on existing Water Works facilities. The entire project (UV and solar) is designed to protect public health with advanced water treatment technology and protect the environment by advancing the use of solar energy. As currently designed, this solar project will represent one of the largest solar-generated electric supply installations in Ohio.

UV disinfection uses UV light, in low doses, to inactivate disease-causing protozoa such as Cryptosporidium and Giardia. No chemicals are added, and there is no residual effect once the water leaves the UV reactor.

There are many serious concerns about the vulnerability of the Ohio River watershed to contamination, including microbial and viral contamination from emerging microorganisms that are resistant to chlorine disinfection, as well as future contamination issues that will need to be addressed. Since 2000 GCWW has been conducting research with national and international groups on technologies available to address these concerns.

In 1993 a deadly waterborne disease outbreak from Cryptosporidium occurred in Milwaukee, Wisconsin. Nearly 400,000 people became ill and over 100 deaths were reported. Chlorine, which is a commonly used disinfectant at water treatment plants, is ineffective in killing Cryptosporidium. UV disinfection at water treatment plants is a proven and effective technology for addressing this contaminant.

Wastewater treatment plants release discharges of municipal wastewater into the Ohio River. Although discharges are regulated, several contaminants of concern, including Crypto, are found in wastewater effluents. Municipal and residential wastewater systems and wastewater treatment plants are known to have incidents of raw sewage discharge or treatment malfunctions

GCWW and the City of Cincinnati have consistently expressed concerns regarding a wastewater treatment plant located near Alexandria, Kentucky, discharging just 11 miles upstream of our drinking water intakes.

New or unexpected contaminants are sure to be discovered in our source water in the future. UV disinfection, combined with GCWW's current treatment processes, provides an extra layer of protection against those contaminants. This is an important step in insuring public health now and for future generations.

The project is scheduled to be complete in early 2013.

Metropolitan Sewer District (MSD)

Prior to 1968, Hamilton County and the City of Cincinnati maintained separate sewage operations. The Metropolitan Sewer District of Greater Cincinnati (MSD) was formed on April 10, 1968, pursuant to an agreement between the Board of County Commissioners of Hamilton County and the City of Cincinnati. The agreement provides for a consolidation of the City Sewer Department and the County Sewer District.

The agreement established the respective responsibilities and duties of the City and the County. Pursuant to the agreement, the County retained authority and control of the Sewer System including, but not limited to, the sole authority to establish sewer service charges, adopt rules and regulations and approve capital improvement programs.

The City is the managing agent for the operation of the Sewer District, subject to the control and direction of the Board as provided in the agreement. Subject to the retained authority of the County, the City agreed to undertake the management and operation of MSD for and on behalf of the County for a period of 50 years commencing on May 1, 1968 and expiring on April 30, 2018. The County agreed to maintain Sewer System service charges and revenues at rates which would at all times be sufficient to pay the reasonable expenses of operation and maintenance

of the Sewer System and the debt service charges on all then existing and future indebtedness of the City and County related to the Sewer System. The County also transferred its entire sewer system related personal property, equipment, and vehicles to the City so that the City could operate the Sewer System. The City agreed to plan, design and supervise the construction of all sewers and sewage treatment facilities, maintain and operate all sanitary and combined sewers and all sewage pumping and treatment facilities and generally operates the Sewer System.

As part of the consolidation, and in connection with the execution of the agreement, the City granted the sole and exclusive use of all sanitary and combined sewers and sewage treatment facilities to the County. The City, however, retained legal title to all such facilities. MSD also provides management and administrative services to the City's Stormwater Utility Management Department for a fee, on an annual basis.

The Department of Sewers of the City is responsible for the performance of the City's responsibilities of the agreement to manage and operate MSD. The head of the Department of Sewers is the Director of MSD and is primarily responsible for the administration of the entire Sewer System, including design, construction, repair, maintenance and operation of all sewers and sewage treatment facilities. The Department of Sewers administers MSD through the Office of the Director and five operating divisions: the Administration Division, the Engineering Division, the Wastewater Treatment Division, the Industrial Waste Division and the Wastewater Collection Division.

Because the City operates MSD and the Sewer System for the County, the Director of Sewers is appointed by the City Manager of the City of Cincinnati and all other supervisory personnel are either appointed by the City Manager or selected pursuant to the civil service rules applicable to City employees.

The Sewer System covers approximately 400 square miles. It serves a residential population of approximately 800,000 and substantially all of the industry in Hamilton County through over 200,000

sewer connections and operates and maintains over 3,100 miles of sanitary and combined sewers, 7 major wastewater treatment plants, 6 package treatment plants, 136 package lift stations and 8 major pumping stations.

Cincinnati, like many older cities in the Northeast and Midwest, has a sewer system that contains both sanitary and combined sewers. Combined sewer systems were based on technology and theories, prevalent until the early to mid-1900's, that both sanitary waste and surface drainage or rain water could be handled jointly and safely discharged directly into streams and rivers. As the systems developed and communities grew, interceptors were used to capture this discharge, bypass the small creeks or streams and discharge it directly into large rivers. Interceptor sewers now have their flow directed to wastewater treatment plants. Combined sewer systems are designed so that during dry weather, an interceptor sewer captures the wastewater and conveys it to a treatment plant. During wet weather, because of the large inflow of stormwater, the combined wastewater and stormwater flow may exceed the capacity of the interceptor sewers resulting in an increased, but still less than complete, flow to the treatment plants, and the remainder discharging directly into creeks, channels or rivers. This discharge is commonly referred to as a combined sewer overflow or "CSO," and is part of the design of the system. As is the case with SSOs, CSOs are also a national issue that has received increasing attention from the U.S. EPA.

Combined Sewer

A combined sewer is a large diameter sewer that carries both storm water and sanitary sewage (wastewater from your drains and toilets) to a treatment plant for treatment. In Hamilton County, combined sewers are generally found in older portions of our community, like the City of Cincinnati. They comprise about 40% of our current sewer system and date back to nearly 180 years old in parts. During heavy rains, combined sewers are often filled beyond their capacity. To relieve pressure on the sewer line and prevent widespread flooding and sewage backups into buildings, combined sewers were designed to overflow directly into local streams, creeks, and rivers through outfall structures known as

combined sewer overflows or CSOs. At the time they were built, CSOs were an acceptable way of handling excess flows, but their environmental impacts are now controlled under the present regulations of the federal Clean Water Act. By the mid 20th century, combined sewers were largely discontinued in favor of separated sanitary sewer and storm water lines.

Sanitary Sewer

Sanitary sewers are small diameter pipes that are not designed to carry storm water. In Hamilton County, sanitary sewers are commonly found in newer areas of Cincinnati and suburban "bedroom communities" that surround the city. Storm water is handled by a separate line.

During heavy rains, however, storm water can enter sanitary sewer lines through manholes, defective sewer pipes, and illicit connections (e.g., downspout connected directly to the sanitary sewer). If the sanitary sewer line is filled beyond capacity, it will overflow through sanitary sewer overflow (SSO) relief structures (constructed as part of manholes) or through manhole lids into local waterways, adjacent yards, and streets. SSOs are considered a greater danger to public health than a CSO, and therefore are not permitted under the Clean Water Act.

Sewer Overflow

A sewer overflow is a discharge of raw sewage mixed with storm water that overflows from a sewer into local streams and rivers. Overflows occur when there is too much wastewater for the sewer system, pump station, or treatment plants to handle, such as after heavy rainstorms. To relieve pressure in the system and minimize backups into homes and businesses, excess sewage is discharged into local waterways. State and federal regulations require the Metropolitan Sewer District of Greater Cincinnati (MSD) and sewer agencies across the country to reduce overflows and meet Clean Water Act requirements.

Sewage overflows affect the quality of water in our streams and rivers, can impact public health, and are aesthetically unpleasant. After heavy rains, many Hamilton County streams and rivers do not meet Ohio state standards for recreational activities such as wading or swimming. Habitat for

fish and other aquatic organisms is also degraded. Overflows are a main source of E. coli bacteria in local water. If you swallow water with high levels of E. coli, you can become ill. Raw sewage can also contain viruses and other pathogens. Sewer overflows also often result in odors and leave unsightly sewer debris behind.

There are different requirements for managing overflows from the combined sewer system and overflows from the sanitary sewer system. The volume coming from CSOs in Hamilton County is much greater than from SSOs; however, regulations are more stringent for SSOs since sanitary sewers are not supposed to release untreated sewage into the environment at all. MSD's goal is to eliminate SSOs and significantly reduce CSOs by implementing affordable controls.

MSD Consent Decree

Every year, about 14.1 billion gallons of raw sewage – mixed with storm water – overflows from our sewers into local streams and rivers and also backs up into basements. Buried deep underground, parts of our current system are deteriorating due to age, and portions are not big enough to handle the present mixture of sewage and storm water that enter it during heavy rains, the result of a sewer system designed to meet the needs of an earlier generation, not our modern society.

In the late 1980's and 1990's, the federal government, through the Clean Water Act, called for the elimination of sanitary sewer overflows (SSOs) and a reduction of discharges from combined sewer overflows (CSOs). This action affected every wastewater system in the country, including the Metropolitan Sewer District of Greater Cincinnati (MSD). Increased scrutiny from the U.S. Department of Justice (DOJ) and U.S. Environmental Protection Agency (EPA) brought the issue to the forefront in the late 1990's as these government bodies began enforcing the ruling in large cities and leveling heavy civil penalties on those out of compliance.

Hamilton County is not alone in this problem. There are roughly 772 communities across the U.S. with aging combined sewer systems, according to the U.S. EPA. These older, urban communities are mainly located in the Northeast and Great Lakes

regions and the Pacific Northwest. Like Hamilton County, many are under federal orders to resolve their sewer overflow issues. Regionally, these areas include Northern Kentucky and Louisville, Columbus and Toledo, Indianapolis, Pittsburgh, and St. Louis.

To better protect our health and the environment, wastewater utilities like ours across the nation are being required to improve their sewer systems, particularly those with combined sewers that carry both sewage and storm water in the same pipes. To resolve this problem, the U.S. EPA has mandated that MSD capture, treat, or remove 85% of the 14 billion gallons of combined sewer overflows (CSOs) and eliminate all sanitary sewer overflows (SSOs), about 100 million gallons. In 1999, MSD entered into negotiations with the EPA, DOJ, and the State of Ohio to establish a formal remediation program that would be recognized and supported by the government, but also was affordable for local ratepayers. This mandate, known as a "Consent Decree," requires Hamilton County residents to invest in their sewer system once again.

Sewer Credit Program

The Ohio Environmental Protection Agency (OEPA) regulates the operation of MSD's local sewer systems, including the combined sewer system. Its policy requires that no changes be made to the combined sewer system that will increase the amount of pollution discharged through CSOs during a rain event. This means that for MSD to make or allow new connections into the combined sewer system, other measures must be taken to remove storm water flow from it. More specifically, for every new gallon of sanitary sewage added to the system, four gallons of storm water must be removed. Directing storm water sources away from the combined sewer and into a creek, stream or river normally accomplishes this.

MSD uses a system of connection "credits" to manage new sewer connections under OEPA's policy. Any change that will increase wastewater flow in the sewer system, such as development or redevelopment, requires an application of credits to connect into the system. The amount of credits owed depends on the amount of wastewater to be introduced through the new connection. In

general, one credit is required for new connections that will generate a flow equivalent to that which is produced by an average single-family residential property. If more wastewater is to be added, more credits will be required. To obtain one connection credit, an amount of storm water equivalent to the amount of wastewater flow generated by four residential properties must be removed from the system.

MSD creates credits by completing sewer improvement projects that increase capacity and flow in the combined sewer system (the number of credits that result from each project depends on the type of work done). MSD then banks its credits and makes them available to developers on a first-come, first-served basis. Developers can also create credits and apply them toward their own projects; however, developers must be aware of regulations guiding credit creation and use. For example, credit-generating projects must be completed upstream of a CSO location, and credits apply only to the sewer drainage area in which they were created – credits acquired for one drainage area cannot be transferred to another. MSD regularly works with developers to identify and locate projects that can result in the generation of connection credits. Credits are valid for three years and can be used at any point during that time.

Connection Credits for Separated Sewer Systems
Approximately 10 percent of the City of Cincinnati uses separated sewer systems to manage wastewater. Separated sewer systems use two separate pipes to manage wastewater: one for sanitary sewage and one for storm water. Even though sanitary sewers are not designed to carry storm water, for many reasons storm water finds its way into sanitary pipes. Then, as with sewers in the combined system, sanitary sewers may become overwhelmed under certain conditions (such as heavy rain) and overflow into area waterways. These overflows are known as Sanitary Sewer Overflows, or SSOs.

Connection credits also apply to separated sewer systems. To create one credit for a separated system, five gallons of storm water must be removed for every one gallon of wastewater added. As with combined sewer systems, MSD

creates credits to be used by developers, or developers may create their own credits by improving the sewer system upstream of an SSO. If an overflow has not occurred at a known SSO location for at least two years, credits are no longer required for new connections to that system.

As properties in areas of the City are being newly developed or redeveloped, or work that will increase the wastewater flow from a property is being planned, sewer connection credits will likely be needed. MSD's Rules and Regulations Article V, Sections 515 and 516 provide the detailed requirements and are available at www.msdc.org.

Project Groundwork (aka Wet Weather Plan/Strategy)

The plan developed in 2006 to address the Global Decree's requirements and to implement capacity-based sanitary sewer and CSO issues of the Interim and Global decrees was known as MSD's Wet Weather Improvement Plan. In 2008, MSD branded this improvement effort as "Project Groundwork", one of the largest public works projects in the history of our community. This multi-year initiative is comprised of hundreds of sewer improvement and storm water control projects across our area.

The projects will provide community benefits through sustainable solutions designed to:

- Reduce combined sewer overflows (CSOs) into local rivers and streams;
- Eliminate sanitary sewer overflows (SSOs) in a typical year;
- Eliminate sewage backups into basements caused by MSD's sewer system;
- Reduce sewage debris and sewage odors in local waterways and make streams more pleasant after heavy rains.

Types of sustainable infrastructure projects include:

- New sewers – to replace existing sewers that are deteriorating or too small.
- Sewer separation – to divide a combined sewer into separate sanitary sewer and storm water lines.

- Upgrading pump stations – to handle greater amounts of wastewater during heavy rains and prevent overflows at the pump station.
- Upgrading treatment plants or building new ones – to treat greater amounts of wastewater during heavy rains.
- Eliminating pump stations and replacing them with gravity sewers – to eliminate overflows and odors at pump stations and reduce energy demands.
- Flow regulators – to control how much sewage and storm water moves through a sewer pipe.
- Enhanced high-rate treatment facilities – to treat combined sewer flows directly at the CSO outfall prior to discharge to a local waterway.
- Underground or aboveground storage facilities (e.g., tunnels) – to store excess wastewater during heavy rains.
- Stream separations or stream "daylighting" that remove storm water from a combined sewer and restore a natural stream channel.
- Green infrastructure such as pervious paving, bioretention basins, green roofs, and bioswales that keep storm water out of sewers.

Since 2004, MSD has already invested about \$300 million in 71 wet weather projects, mainly focused on eliminating SSOs such as SSO 700, located along the Mill Creek in Reading.

Project Groundwork will be conducted in two phases: Phase 1 (2009-2018) and Phase 2 (after 2018).

Phase I (2009-2018)

Phase I projects, estimated to cost about \$1.145 billion (in 2006 dollars), must be completed by or before 2018. Phase I projects and their schedules are stipulated in a "wet weather plan," which was conditionally approved by the U.S. and Ohio EPAs in June 2009.

Phase I is comprised of:

- 45 construction projects, including a deep tunnel to store storm water and wastewater in the Lower Mill Creek area. These sewer infrastructure improvements will take place in Green, Springfield, and Symmes townships, the City of Cheviot, and 19 neighborhoods within the City of Cincinnati.
- A 3-year action plan (2009-2011) for the Lower Mill Creek area, located to the west and northwest of downtown Cincinnati, to resolve two billion gallons of combined sewer overflows each year. The remedy listed is a deep tunnel, but MSD is researching more sustainable alternatives.
- A 3-year study (2009-2011) to determine the best "green practices" to control storm water flows in combined sewer areas.
- Planning work for specific projects to be completed in Phase 2.

Phase I projects will be complemented by Project Groundwork Asset Management and Assessment Sewer projects.

Phase 2 (after 2018)

Phase 2, estimated to cost about \$2.1 billion (in 2006 dollars), is comprised of about 256 construction projects across Hamilton County. The Phase 2 projects are stipulated in a "wet weather plan," which was conditionally approved by the U.S. and Ohio EPAs in June 2009. The project schedule for Phase 2 has not yet been developed. It must be submitted to the U.S. and Ohio EPAs by 2017 for approval. Planning and design of these projects may occur prior to the 2017 schedule submittal. Phase 2 projects will be

complemented by Project Groundwork Asset Management and Assessment Sewer projects.

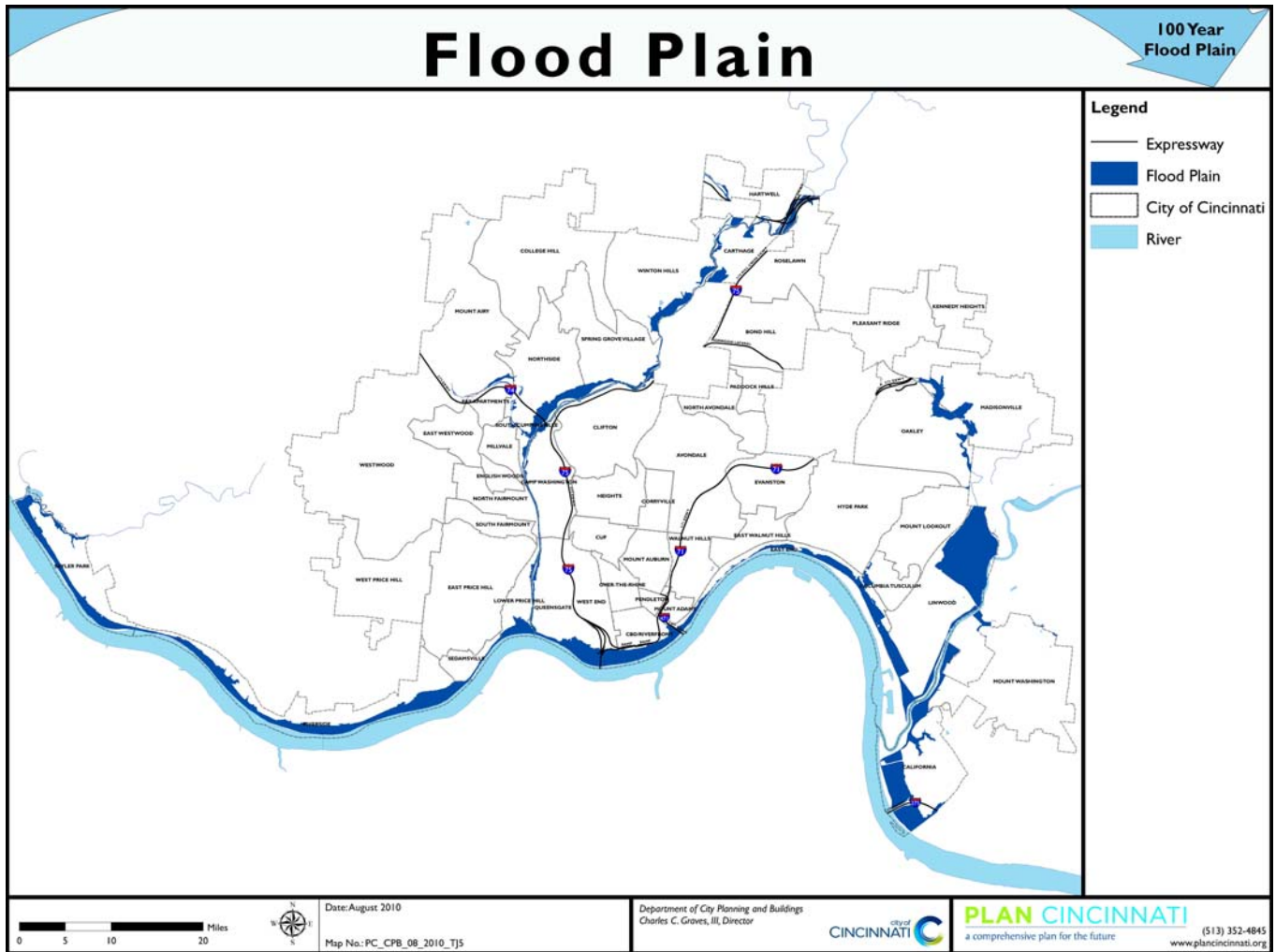
Floodplain Management

Federal Emergency Management Agency (FEMA) is a part of the United States Department of Homeland Security and their mission is to support U.S. citizens and first responders to ensure that as a nation we work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards. They work off of the Statutory Authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988. FEMA is also responsible for the National Flood Insurance Program and floodplain management.

According to FEMA, the definition of floodplain management is the operation of a community program of corrective and preventative measures for reducing flood damage. Communities across the nation agree to adopt and enforce floodplain management ordinances, particularly in new construction cases, which is an important piece of making flood insurance available to home and business owners.

Flood zones are geographic areas that FEMA has defined according to varying levels of flood risk. These zones are depicted on a community's Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map. Each zone reflects the severity or type of flooding in the area.

Parts of Cincinnati are considered to be in Moderate to Low Risk flood zones, generally near the Ohio River and other waterways throughout the city. FEMA's maps designate areas of low flood hazard (areas where flooding has a 0.2% chance of being exceeded in any given year; formerly referred to as a 500-year flood zone) and areas of moderate flood hazard (areas where flooding has a 1% chance of being exceeded in any given year; formerly referred to as a 100-year flood zone). Chapter 1109 of the Cincinnati Municipal Code contains the "Flood Damage Reduction" regulations to maintain the City's compliance with the National Flood Insurance Program (NFIP).



Lunken Levee' Decertification

FEMA modified the Hamilton County Flood Maps showing the Lunken Airport within the regulatory flood plain effective February 17, 2010. FEMA's reason was the levee' around Lunken Airport did not protect to the height of base flood elevation (BFE) plus 3 feet. The 3 feet freeboard requirement is where the Lunken levee' fell short. Therefore affected property owners must now

purchase flood insurance and construction of new buildings or addition to existing buildings will be cost prohibitive or technically infeasible. The existing grade around the airport is about 484 feet. The BFE at this location is at 501 feet. Any new construction or substantial improvement will need to be elevated by approximately 17 feet to be above the BFE and this would be a costly proposition.

Energy

Smart Grid

Smart grid is an umbrella term that covers modernization of both the transmission and distribution grids. The modernization is directed at a disparate set of goals including facilitating greater competition between providers, enabling greater use of variable energy sources, establishing the automation and monitoring capabilities needed for bulk transmission at cross continent distances, and enabling the use of market forces to drive energy conservation.

Smart grid technology delivers electricity from suppliers to consumers using digital technology with two-way communications to control appliances at consumers' homes to save energy, reduce cost and increase reliability and transparency. Smart grid technologies overlay the electrical grid with an information and net metering system to increase the efficiency and security of the electrical grid. Such a modernized electricity network is being promoted by many governments as a way of addressing energy independence, global warming and emergency resilience issues. Smart meters may be part of a smart grid, but alone do not constitute a smart grid.

The smart grid is made possible by applying sensing, measurement and control devices with two-way communications to electricity production, transmission, distribution and consumption parts of the power grid that communicate information about grid condition to system users, operators and automated devices, making it possible to dynamically respond to changes in grid condition. A smart grid will include an intelligent monitoring system that keeps track of all electricity flowing in the system. The smart grid can integrate renewable electricity such as solar and wind to offset peak use demands. When power is least expensive the user can allow the smart grid to turn on selected home appliances such as washing machines or factory processes that can run at arbitrary hours. At peak times it could turn off selected appliances to reduce demand.

Many smart grid features readily apparent to consumers such as smart meters serve the energy efficiency goal. The approach is to make it possible for energy suppliers to charge variable electric rates so that charges would reflect the large differences in cost of generating electricity during peak or off peak periods. Such capabilities allow load control switches to control large energy consuming devices such as hot water heaters so that they consume electricity when it is cheaper to produce. To reduce demand during the high cost peak usage periods, communications and metering technologies inform smart devices in the home and business when energy demand is high and track how much electricity is used and when it is used. To motivate them to cut back use and perform what is called peak curtailment or peak leveling, prices of electricity are increased during high demand periods, and decreased during low demand periods.

It is thought that consumers and businesses will tend to consume less during high demand periods if it is possible for consumers and consumer devices to be aware of the high price premium for using electricity at peak periods, this could mean cooking dinner at 9pm instead of 5pm. When businesses and consumers see a direct economic benefit of not having to pay double for the same energy use to become more energy efficient, the theory is that they will include energy cost of operation into their consumer device and building construction decisions.

There are a great many smart grid definitions, some functional, some technological, and some benefits-oriented. A common element to most definitions is the application of digital processing and communications to the power grid, making data flow and information management central to the smart grid. Various capabilities result from the deeply integrated use of digital technology with power grids, and integration of the new grid information flows into utility processes and systems is one of the key issues in the design of smart grids. Electric utilities now find themselves making three classes of transformations: improvement of infrastructure; addition of the

digital layer, which is the essence of the smart grid; and business process transformation, necessary to capitalize on the investments in smart technology. Much of the modernization work that has been going on in electric grid modernization, especially substation and distribution automation, is now included in the general concept of the smart grid, but additional capabilities are evolving as well.

Governments and utilities funding development of grid modernization have defined the functions required for smart grids. According to the United States Department of Energy's Modern Grid Initiative report, a modern smart grid must:

- Be able to heal itself
- Motivate consumers to actively participate in operations of the grid
- Resist attack
- Provide higher quality power that will save money wasted from outages
- Accommodate all generation and storage options
- Enable electricity markets to flourish
- Run more efficiently
- Enable higher penetration of intermittent power generation sources

Federal Policy for Smart Grid

Support for smart grids became federal policy with passage of the Energy Independence and Security Act of 2007. The law, Title 13, sets out \$100 million in funding per fiscal year from 2008–2012, establishes a matching program to states, utilities and consumers to build smart grid capabilities, and creates a Grid Modernization Commission to assess the benefits of demand response and to recommend needed protocol standards. The Energy Independence and Security Act of 2007 directs the National Institute of Standards and Technology to coordinate the development of smart grid standards, which Federal Energy Regulatory Commission (FERC) would then promulgate through official rulemakings. Smart grids received further support with the passage of the American Recovery and Reinvestment Act of 2009, which set aside \$11 billion for the creation of a smart grid.

President Barack Obama announced the largest single electric grid modernization investment in

U.S. history on Oct. 27, 2009, with DOE tapping \$3.4 billion in American Reinvestment and Recovery Act funds for 100 projects. The funds will be matched by \$4.7 billion in private investments. According to the president, the smart grid projects will help build a renewable energy superhighway, with a goal of increasing energy efficiency and helping to spur the growth of renewable energy resources such as wind and solar power. The grants range from \$400,000 to \$200 million, and will reach every state except Alaska.

The smart grid grants will pay for installing more than 2.5 million smart meters, which allow utility customers to access dynamic pricing information and avoid periods of peak electricity use, when power is most expensive. The grants will also support the installation of other smart grid components, including more than 1 million in-home energy displays, 170,000 smart thermostats, and 175,000 other load control devices to enable consumers to reduce their energy use. The funding will help expand the market for smart washers, dryers, and dishwashers, so that U.S. residents can further control their energy use and lower their electricity bills. Such smart grid technologies can also better accommodate the use of plug-in electric vehicles and the production of renewable energy from customer-owned systems, such as solar power systems or wind turbines.

Much of the funding will support upgrades to the utility power grids, including the installation of more than 200,000 smart transformers, which will make it possible for power companies to replace units before they fail. Utilities will also install more than 850 sensors that will cover the entire electric grid in the contiguous United States, making it possible for grid operators to better monitor grid conditions and allowing them to take advantage of intermittent renewable energy, such as wind and solar power. Finally, utilities will install nearly 700 automated substations, which will make it possible for power companies to respond faster and more effectively to restore service when bad weather knocks down power lines or causes electricity disruptions.

Alternative Energy Sources

Solar Power

This alternative energy source is readily available and easily capable of providing many times the total current energy demand. It is not available at all times, but can be stored or supplemented by another energy source during that time. Solar panels are used for collecting energy from the sun and are a clean and environmentally-friendly way of collecting solar energy.

GCWW Solar Panel Installation

In 2009, a 42 KW solar array was installed on the roof of GCWW's Spring Grove Avenue facility. Plans are underway to add an additional 279 KW solar array. This combined installation will create enough power to cover nearly 12% of the facility's annual electric usage. The sunlight causes photovoltaic (PV) cells to generate electricity within the building, which includes lights, boilers, HVAC system, etc.

The roof of the proposed UV building at the Richard Miller Treatment Plant will include solar panels covering 7,200 square feet, and generate an estimated 72 KW. The combined solar project will give GCWW a solar electric generating capacity of 393 KW and will represent one of the larger planned solar arrays in the State of Ohio. After completion, 535,070 lbs of carbon dioxide will be avoided per year.

Wind Power

Wind can be a useful form of energy. There are several tools used in collecting wind as energy. Wind turbines are used to make electricity, wind mills are used for mechanical power, and wind pumps are used for pumping water or drainage. Wind is even harnessed by sails to propel ships.

Biomass Power

This is a renewable energy source that is biological material from living organisms. It is generally plant matter grown to generate electricity or produce heat, but can also be in the form of wood, waste, hydrogen, and alcohol fuels.

Communication

The telecommunications industry is a system of switches and lines that interconnect to provide communication between multiple parties. Today, the telecommunications industry includes local telephone service, long distance telephone service, wireless telephone service, paging service, Internet service, Voice over Internet Protocol (VoIP), and a wide array of other competitive products and services. All of these different methods of communication operate through networks forming a global telecommunications industry.

Telephone

Telephone service in Hamilton County is provided by Cincinnati Bell.

Cellular Communications

Cincinnati is served by several cellular carriers, and there are 724 Federal Communications Commission (FCC) registered cell towers in the Cincinnati area.

Broadband

Broadband in telecommunications refers to a signaling method that includes or handles a relatively wide range (or band) of frequencies, which may be divided into channels or frequency bins. Broadband is always a relative term, understood according to its context. The wider (or broader) the bandwidth of a channel, the greater the information-carrying capacity. In radio, for example, a very narrow-band signal will carry Morse code; a broader band will carry speech; a still broader band is required to carry music without losing the high audio frequencies required for realistic sound reproduction. A television antenna described as "broadband" may be capable of receiving a wide range of channels; while a single-frequency or Lo-VHF antenna is "narrowband" since it only receives 1 to 5 channels. In data communications a digital modem

will transmit a data rate of 56 kilobits per second (kbit/s) over a 4 kilohertz wide telephone line (narrowband or voiceband). However when that same line is converted to a non-loaded twisted-pair wire (no telephone filters), it becomes hundreds of kilohertz wide (broadband) and can carry several megabits per second (ADSL).

Broadband in data can refer to broadband networks or broadband Internet and may have the same meaning as above, so that data transmission over a fiber optic cable would be referred to as broadband as compared to a telephone modem operating at 56,000 bits per second. However, a worldwide standard for what level of bandwidth and network speeds actually constitute Broadband have not been determined.

However, broadband in data communications is frequently used in a more technical sense to refer to data transmission where multiple pieces of data are sent simultaneously to increase the effective rate of transmission, regardless of data signaling rate. In network engineering this term is used for methods where two or more signals share a medium. Broadband Internet access, often shortened to just broadband, is a high data rate Internet access—typically contrasted with dial-up access using a 56k modem.

Dial-up modems are limited to a bitrate of less than 56 kbit/s (kilobits per second) and require the full use of a telephone line—whereas broadband technologies supply more than double this rate and generally without disrupting telephone use.

Sustainable Public Infrastructure

Sustainability

According to the U.S. Environmental Protection Agency (USEPA), the traditional definition of sustainability calls for policies and strategies that meet society’s present needs without compromising the ability of future generations to meet their own needs.

The 1970 National Environmental Policy Act (NEPA) formally established as a national goal the creation and maintenance of conditions under which humans and nature “can exist in productive harmony, and fulfill the social, economic and other requirements of present and future generations of Americans”.

The concept of sustainable development was described in a 1981 White House Council on Environmental Quality report: “The key concept here is sustainable development. If economic development is to be successful over the long term, it must proceed in a way that protects the natural resource base of developing countries.”

In the 30 years since that time, the concept of sustainability has evolved to reflect perspectives of both the public and private sectors. A public policy perspective would define sustainability as the satisfaction of basic economic, social, and security needs now and in the future without undermining the natural resource base and environmental quality on which life depends. From a business perspective, the goal of sustainability is to increase long-term shareholder and social value, while decreasing industry’s use of materials and reducing negative impacts on the environment.

Common to both the public policy and business perspectives is recognition of the need to support a growing economy while reducing the social and economic costs of economic growth. Sustainable development can foster policies that integrate environmental, economic, and social values in decision making. From a business perspective, sustainable development favors an approach based on capturing system dynamics, building resilient and

adaptive systems, anticipating and managing variability and risk, and earning a profit.

Sustainable development reflects not the trade-off between business and the environment but the synergy between them.

Source: www.epa.gov

Communities of the Future

Communities of the Future is a unique framework for combining sustainable sewer improvements with urban renewal in areas which experience frequent CSOs. MSD is partnering with local communities to identify solutions to sewer overflows that simultaneously address community issues such as brownfields redevelopment, urban blight, vacancy, and property abandonment. This approach can provide tangible community benefits such as improved housing and transportation, increased safety, lower crime, and enhanced parks and recreation. MSD is currently pursuing potential opportunities in Carthage and South Fairmount, both located in the Lower Mill Creek watershed. The focus of Communities of the Future is to provide the biggest public benefit for the financial investment made in sewer improvements.

Advisory Committee

Advises, provides technical assistance & partnerships to the Communities of the Future Strategy

Organized into three sub-groups:

1. Policy: Develops and suggests policy initiatives and strategies for integration of Communities of the Future with other planning efforts
2. Economic Development: Advises on tactics to make Communities of the Future catalysts for Community revitalization
3. Inform & Influence: Identifies and advises on strategies to include all stakeholders
 - Currently focusing on Lick Run basin
 - Attention will turn to other basins as those develop

- Doing much of the work of planning the upcoming Lick Run Open House
- CFAC’s primary purpose is to add community engagement and revitalization to MSDGC’s expertise, or: Turning sewer fixes into Communities of the Future

Policy

Integration with on-going planning efforts
Expanding green infrastructure use into the private sector
Analyzing the effectiveness of City and County Stormwater Regulations
Compliance with Regulators

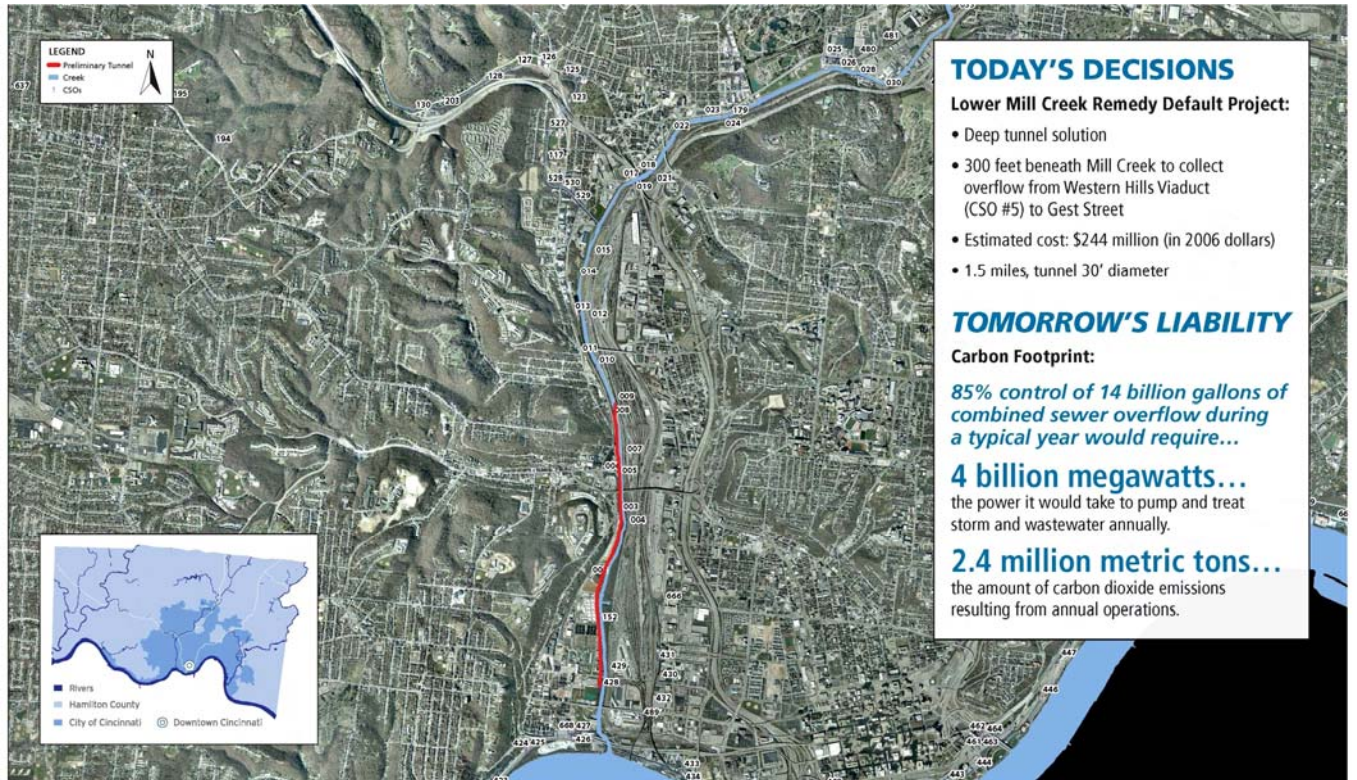
Communities of the Future Working Group Focus Areas

Inform and Influence

Identifying Community Stakeholders
Developing Communication Plan for Ratepayers, and affected Communities
Preparing for Community Outreach Opportunities

Economic Development

Brownfield restoration and redevelopment
Property Acquisition
Identifying investment opportunities
Business Case Evaluation
Identifying possible sources of funding for streetscape enhancements



Techniques

Stream Daylighting

MSD is exploring ways to remove large volumes of storm water from the combined sewer system. Examples include controlling runoff from hillsides, separating or "daylighting" streams that were turned into combined sewers, and bioretention basins. Much of this effort is focusing on the Lower Mill Creek watershed area, which is slated for a \$244 million special tunnel project mandated under Phase I of Project Groundwork.

The deep tunnel (about 1.2 miles long and 30 feet in diameter), along with an enhanced high-rate treatment facility, would be used to store and treat excess sewage and storm water during high-flow periods, preventing about two billion gallons of annual combined sewer overflows. MSD hopes to replace or supplement the tunnel with less expensive and potentially more sustainable solutions such as stream daylighting or a more comprehensive "Communities of the Future" approach.

"Daylighting" describes projects that deliberately expose the flow of a previously covered river, stream or stormwater drainage. Daylighting projects liberate waterways that were buried in culverts or pipes, or otherwise removed from view. Daylighting re-establishes a waterway in its old channel where feasible, or in a new channel threaded between the buildings, streets, parking lots, and playing fields now present on the land. Some daylighting projects recreate wetlands, ponds, or estuaries.

Stream daylighting projects can be applied to:

- Relieve choke points and flooding from under-capacity culverts;
- Increase hydraulic capacity over that provided by a culvert, by recreating a floodplain;
- Reduce runoff velocities and erosion, as a result of natural channel meandering and the roughness of the stream bottom and banks;
- Replace deteriorating culverts with open drainage that can be more easily monitored and repaired;

- Divert urban runoff from combined sewer systems before it mixes with sewage, reducing combined sewer overflows and burdens on treatment plants;
- Improve water quality by exposing water to air, sunlight, vegetation, and soil, all of which help transform, bind up, or otherwise neutralize pollutants;
- Recreate aquatic habitat and improve fish passage;
- Recreate valuable riparian habitat and corridors for wildlife movement;
- Provide recreational amenities, such as a challenging new water hazard on a golf course, a place for children to play, or a streamside bench for people to relax upon;
- Create or link urban greenways and paths for pedestrians and bicyclists;
- Beautify neighborhoods, perhaps serving as a focal point of a new park or neighborhood revitalization.

Excerpted from Daylighting: New Hope for Buried Streams, Rocky Mountain Institute, <http://www.rmi.org>

Permeable Surfaces

In most non-urban landscapes, rainwater percolates into the ground where it falls, slowly making its way through plant roots and soil to the groundwater reservoirs and aquifers which hold much of our drinking water. In cities and suburban areas, millions of square feet of concrete, asphalt, roofs, and other impermeable surfaces create enormous quantities of runoff which can overwhelm natural drainages, over saturate the areas where water does collect, and divert water away from groundwater reservoirs.

Working to manage rainwater where it falls by promoting rain gardens and green roofs, and encouraging landscaping of areas not essential for hard pavement serves to keep the water clean, and allows it to soak directly into the ground. Increasing and improving permeable surface in the urban landscape means less water running across the land, bringing less pollution to our rivers and streams.

Bioretention Basins

Bioretention basins are landscaped depressions or shallow basins used to slow and treat on-site stormwater runoff. Stormwater is directed to the basin and then percolates through the system where it is treated by a number of physical, chemical and biological processes. The slowed, cleaned water is allowed to infiltrate native soils or directed to nearby stormwater drains or receiving waters. Typically bioretention practices are best suited to small sites and highly urbanized spaces. The use of bioretention practices is possible given adaptations to specific site usage conditions are followed, these include:

- Areas where little pervious surface exist, such as parking lots, large buildings or sheds, are ideal candidates for use of bioretention practices such as a bioretention basin. These systems require a relatively large area of land—about five percent of area drained however, they can be fit into existing parking lot islands and adjoining landscaped areas.
- Areas with highly contaminated runoff, like gas stations and convenience store parking lots, must have the bottom of bioretention basin lined with impermeable liner to prevent egress of contaminated water to nearby stormwater drains, groundwater sources and receiving waters.
- Areas where existing developments are being required to retrofit with stormwater management practices to improve on negative impacts of stormwater will find bioretention a suitable option that can be implemented by modifying present landscape or adding to a parking lot that is being resurfaced. Remember bioretention is best employed for small sites and becomes expensive (land and development costs) when trying to apply to large areas.

Bioswales

Bioswales are landscape elements designed to remove silt and pollution from surface runoff water. They consist of a swaled drainage course with gently sloped sides (less than six percent) and filled with vegetation, compost and/or riprap. The water's flow path, along with the wide and shallow ditch, is designed to maximize the time water spends in the swale, which aids the trapping of pollutants and silt. Depending upon the geometry

of land available, a bioswale may have a meandering or almost straight channel alignment. Biological factors also contribute to the breakdown of certain pollutants. A common application is around parking lots, where substantial automotive pollution is collected by the paving and then flushed by rain. The bioswale, or other type of biofilter, wraps around the parking lot and treats the runoff before releasing it to the watershed or storm sewer

Plans and Partnerships

The Green Partnership for Greater Cincinnati

The Green Partnership for Greater Cincinnati (GPGC) is a collaboration between five major regional institutions: City of Cincinnati, Hamilton County, Cincinnati Public Schools, University of Cincinnati and Duke Energy. The partnership's goal is to encourage and support efforts that will measurably improve environmental performance, save money for the GPGC partners, and demonstrate commitment and leadership to the Greater Cincinnati community.

Together the GPGC partners employ and educate tens of thousands of people, operate thousands of buildings and motor vehicles, and manage tens of thousands of acres of land. All five institutions already engage in a broad range of environmental programs, and each institution has specific expertise and resources in such areas as education, energy efficiency and recycling. GPGC has formed project teams comprised of employees from all of the partners to address eight priorities that will increase the sustainability of the partner organizations.

These priorities are:

- Communication and outreach
- Comprehensive recycling initiative
- Green buildings and energy use reduction
- Use of mass transit and alternative transportation options
- Environmentally preferred purchasing
- Comprehensive environmental education
- Fleet vehicle options
- Land and water management best practices

Each team will develop specific projects to be implemented over the next 1-3 years. These projects will apply directly to the operations, programs and facilities owned and managed by the partner institutions. More than 100 people from the partner organizations helped set the project agenda and develop the specific team objectives to be shared at the partnership launch.

Project I—Mass Transit and Alternative Transportation Options

This project will encourage a partner coordinated approach to mass transit and alternative transportation use by partner employees and students (and others). Partners will combine efforts to evaluate programs and will work with SORTA to increase ridership and make easy use options are readily available.

Project II—Communication and Outreach

Efforts for this project are targeted at GPGC communications both internally and externally. Internally the purpose will be to develop a structure that promotes easy communication among the members of each project team, among the various teams and between the teams and the steering committee.

Project III—Comprehensive Recycling Initiative

This project will develop specific goals and targets for improving waste diversion within the partner institutions through coordinated efforts and better use of existing resources. The efforts will be focused on ways to improve compliance, more efficiently manage and collect recyclables, improve program targets at difficult-to-recycle materials, promote reuse of surplus equipment and supplies, and divert waste streams to more productive uses.

Project IV—Green Buildings/Energy Reduction

The purpose of this project is to encourage and support partner efforts to improve energy efficiency and performance of buildings currently in the partner inventory, most of which are older and were built when different standards were applicable. The focus will be on professional level audits, scaled up meet the ambitious requirements of climate changes initiatives.

Project V—Environmentally Preferred Purchasing

This project will encourage and support green purchasing efforts of the partners by taking advantage of economies of scale, effective information sharing and education about acquisition and use of green products and services. *Project VI—Comprehensive Environmental Education*
This project will link partner interests and resources to help the environmental educators both within the schools and in allied programs.

Project VII—Fleet Vehicle Options

This will be tightly targeted initiative to accelerate the greening of partner fleets and internal fleet/transportation polities. Partner climate change commitments require serious evaluations of fleets and vehicle/transportation choices and conversion to greener options whenever feasible. Policies governing use of fleets can also have impact and reduce fossil fuel use.

Project VIII—Land and Water Management Best Practices

Partners will work with the Metropolitan Sewer District of Greater Cincinnati (MSDGC), the Hamilton County soil Conservation Service and others to implement storm water best practices on public and other lands owned or managed by the partners, especially focused on reducing storm water impacts that contribute to combined and separate sewer overflows.

Green Cincinnati Plan

The Green Cincinnati Plan (formerly Climate Protection Action Plan), as part of Mayor Mallory's Green Cincinnati Initiative, is a roadmap for how Cincinnati can become a national leader in addressing global climate change and thus make Cincinnati a healthier place to live.

Cincinnati is one of more than 1,000 U.S. Cities that has committed to reducing its contribution to global climate change. According to the Office of Environmental Quality (OEQ), the more we learn about how to combat climate change, the more we realize that climate protection measures are mostly things that we have good reason to be doing anyway. Climate protection measures can help conserve scarce natural resources, save money, enhance the local economy, improve air quality, create jobs, and improve public health. But as with so many things, there is more than one way to do

it, and whether climate protection work helps or hurts our community depends on the paths that we choose.

The Green Cincinnati Plan does the following:

- Identifies over 80 specific recommendations for how to reduce contributions to global climate change. The recommended actions generally share several characteristics:
 - Effectively reducing green house gas emissions.
 - Reducing dependence on non-renewable energy sources
 - Saving more money than the recommended actions cost
 - Supporting local job creation and the local economy
 - Helping clean Cincinnati's air, land, and water
 - Relying on voluntary rather than regulatory approaches
- Quantifies annual contributions to global climate change at 8.5 million tons of carbon dioxide equivalent (CO₂e) for the City of Cincinnati, and 432,000 tons of CO₂e for Cincinnati City Government.
- Establishes green house gas emission reduction goals of 8% within 4 years, 40% within 20 years, and 84% by 2050 (42 years).
- Presents a strategy to implement the Plan's recommendations

The full text of the Climate Protection Action Plan can be viewed on the City's website at http://www.cincinnati-oh.gov/cmgr/downloads/cmgr_pdf18280.pdf

Green Cincinnati Plan Implementation - City Government Energy Management

In the Green Cincinnati Plan process, it was determined that Cincinnati city government produced 432,179 tons (392,000 metric tonnes) of greenhouse gas emissions. The Green Cincinnati Plan commits to reduce greenhouse gas emissions by 2% per year.

State of Ohio enabling legislation introduced in 1994 allows municipalities to fund capital improvements with energy and operational savings through a performance-based approach. The installation of energy saving measures can be

financed by Ohio municipalities over a term up to the average useful life of the equipment, typically 15 years, and is not included in the calculation of the municipality's net indebtedness. Cincinnati entered into contracts with two energy services performance contractors in June 2008 and energy efficiency building audits have been completed at approximately 39 buildings to date, including City Hall and the Convention Center. Additional building audits at several facilities managed by various departments are currently ongoing.

To date, nearly \$5.6 million worth of energy efficiency updates have been proposed and contracts are final. The lighting, heating and air conditioning, building automation, and building envelope upgrades proposed to date will reduce energy use by 3,290,539 kWh, generate 45,817 kWh of renewable energy, and reduce greenhouse gas emissions by 3,413 metro tonnes. The majority of the project work will be self-funded with guaranteed energy savings and energy rebates and are expected to be completed by the end of 2009. Only \$351,675 of Energy Efficiency Community Block Grant (EECBG) funds are needed for the gap financing to make these first-round projects happen. The City owns and operates more than 400 facilities. The remaining EECBG funding will be administered by the City's Energy Management Team and used at additional facilities to fill the gap for additional energy efficiency projects that are not fully self-funded from the energy savings. Additional audits are already underway, city processes to pay down the debt services are in place, and baseline contracts have been negotiated. Future contracts can be finalized quickly once the facility audits are completed and the scope of work is identified. The Energy Management Team will include an EECBG discussion on the regularly scheduled monthly meeting agenda to track the progress of the projects.

Based on the findings from the first projects, we expect that the full \$1,139,600 EECBG project budget will create and retain a total of 12 jobs and generate over \$18 million of energy efficiency upgrades. This work is expected to result in total energy reduction of 10,062,959 kWh, energy generation of 148,470 kWh, and reduction of greenhouse gas emissions by 11,060 metric tonnes

Source: Office of Environmental Quality

Green Technologies

The mayor and city administration promote new green technologies which sustain the environment as well as supporting existing and new jobs in the City of Cincinnati, Hamilton County, and the region. The most prominent program is the collaborative effort being implemented by MSD called “Villages of the Future”. Other notable City green initiatives include green building construction, site design, LEED, green roofs, geothermal, GHG reductions, green infrastructure and sustainable design, and certified diesel emission reduction.